

N91-10950

FAULT MONITORING

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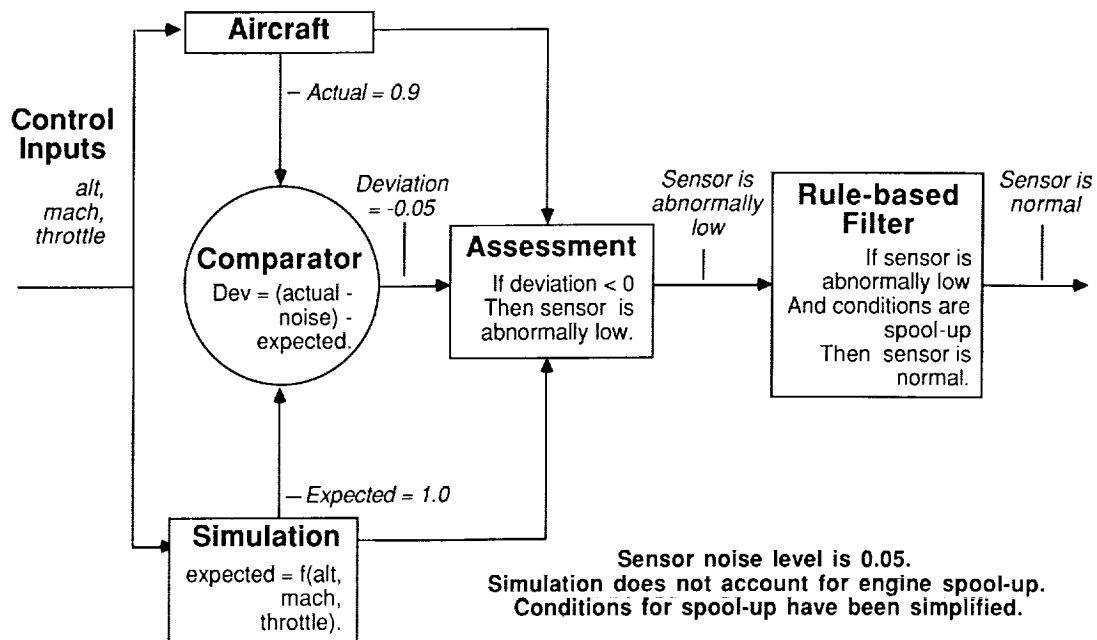
FAULT MONITORING IN THE AIRCRAFT DOMAIN

- - Develops behavioral expectations
 - Collects relevant data
 - Makes appropriate comparisons
 - Interprets data into information
- Provides subsystem information which either directly or indirectly leads to an appropriate response.
- "Acts like a flight engineer"

Information Requirements

- Caution and warning exceedances
- Degradations (abnormal but within range)
- Data interpretation
- Dynamic information (derivatives)
- Relative parameter information
- Low level of false alarms

MONITAUR ARCHITECTURE



IMPLEMENTATION

Characteristics

- **Monitors turbofan engine**
- **Separate device data base**
- **Sensor-centered object oriented design**
- **Written in Common Lisp**

Anticipated Benefits of MONITAUR Concept

- Early detection of abnormalities
- Minimal interpretation of data
- Quality system state description
- Low number of false alarms
- Relatively low implementation expense

REMAINING WORK

- **Determine false alarm rate**
 - on Symbolics using aircraft data
 - on a PC in an LaRC test aircraft
- **Implement for other subsystems**
(e.g. electrical, hydraulic)
- **Implement on other test aircraft**

REMAINING ISSUES

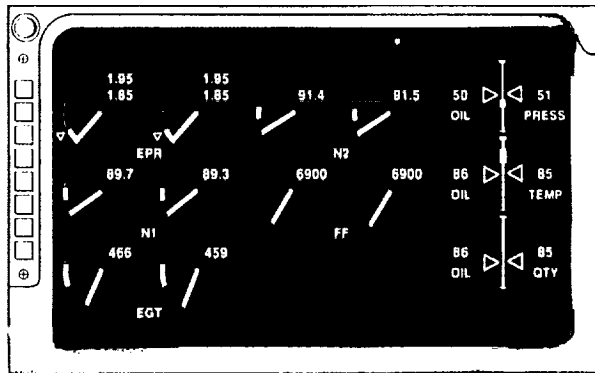
- Prioritize monitoring tasks
- Develop guidelines for knowledge acquisition of rules and noise levels
- Evaluate effects of faulty inputs to the model
- Assess the risk of false alarms

E-MACS

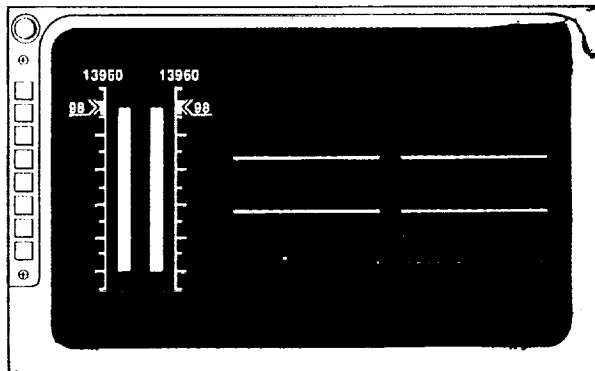
Engine Monitoring and Control System

Situation: *Normal engine power-up for takeoff.*

Traditional

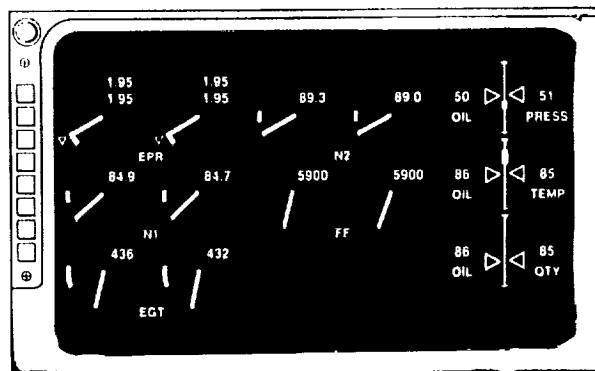


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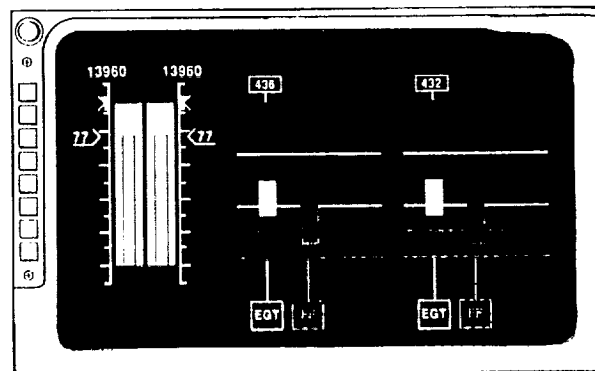


Situation: *Incorrect sensor (EPR). Similar to the 1982 Air Florida accident at Washington National Airport.*

Traditional



E-MACS



1. **Identify the main components of the system.** The system consists of a **client** and a **server**. The client is responsible for sending requests to the server, and the server is responsible for processing these requests and returning responses.

2. **Describe the data flow.** Data flows from the client to the server via a **network**. The client sends a request, and the server returns a response.

3. **Explain the communication protocol.** The communication protocol is based on **HTTP** (Hypertext Transfer Protocol). The client sends an **HTTP request** to the server, and the server returns an **HTTP response**.

4. **Detail the error handling.** The system includes error handling mechanisms to manage **exceptions** and **errors**. These mechanisms ensure that the system can gracefully handle unexpected situations and provide meaningful feedback to the user.

5. **Summarize the overall architecture.** The overall architecture is a **client-server architecture**. The client and server are connected via a network, and they communicate using the HTTP protocol. The system is designed to be scalable and robust, capable of handling a large number of concurrent requests.

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